QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Matrix	Separated Solids
Analytical Group	PCBs – Congeners and Homologs
Concentration Level	Low
Sampling SOP	SW-19
Analytical Method/ SOP Reference	AP-3
Sampler's Name	AECOM Field Staff
Field Sampling Organization	AECOM
Analytical Organization	Analytical Perspectives
Number of Sample Locations	6

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	Measurement Performance Criteria
MB	1/Batch (20 samples)	No Target Compounds>1/10 concentration in associated samples	Assess impact on data; Re-extract or qualify data as necessary	Analyst/Section Supervisor	Accuracy/Bias Contamination	No Target Compounds>1/10 concentration in associated samples
Instrument Blank	Once per 12 hours if MB is not run	No Target Compounds>1/10 concentration in associated samples	Assess impact on data; Re-extract or qualify data as necessary	Analyst/Section Supervisor	Accuracy/Bias-Contamination	No Target Compounds>1/10 concentration in associated samples
Equipment Rinsate Blank	1 per week per sampling team per task	No Target Compounds>1/10 concentration in associated samples	Assess contamination sources in the field and/or in supplies; qualify data as necessary	AECOM FTM/ Data Validators	Accuracy/Bias Contamination	No Target Compounds>1/10 concentration in associated samples

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Batch Control Spike	1/Batch (20 samples)	Native compounds by isotope dilution %D vs. ICAL ≤ 30%; Native compounds measured against an isotopic isomer vs. ICAL %D = 50%; Labeled standard %D vs. ICAL ≤ 50%; Native Compound RPDs ≤ 20% for isotope dilution and ≤ 30% for isotopic isomer; Standard RPDs ≤ 50%	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias	Native compounds by isotope dilution %D vs. ICAL ≤ 30%; Native compounds measured against an isotopic isomer vs. ICAL %D = 50%; Labeled standard %D vs. ICAL ≤ 50%; Native Compound RPDs ≤ 20% for isotope dilution and ≤ 30% for isotopic isomer; Standard RPDs ≤ 50%
Pre-extraction Internal Standards	Spiked into every sample and QC sample	Per EPA Method 1668B Table 6	Check all calculations for error; ensure that instrument performance is acceptable; Assess impact on data; Re-extract or qualify data as necessary.	Analyst/Section Supervisor	Accuracy/Bias	Per EPA Method 1668B Table 6
Field Duplicate	1/20 field samples	RPD ≤ 50% if both samples are > 5x EML	Evaluate during data validation. Qualify data.	Data Validators	Precision[a]	RPD ≤ 50% if both samples are >5x EML
PE	1	Supplier Certified Limits	Provide feedback to laboratory/laboratory reviews data and implements CA as necessary.	AECOM Chemists/ Laboratory Staff	Accuracy/Bias	Supplier Certified Limits

[a] Field duplicates (co-located samples) will be the only precision DQI for the HV solids samples. Laboratory duplicates are not possible, as the entire sample is required for the extraction, and cannot be split.

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Matrix	Sorption Media (PUF)
Analytical Group	PCBs – Congeners and Homologs
Concentration Level	Low
Sampling SOP	SW-19
Analytical Method/ SOP Reference	AP-3
Sampler's Name	AECOM Field Staff
Field Sampling Organization	AECOM
Analytical Organization	Analytical Perspectives
Number of Sample Locations	6

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	Measurement Performance Criteria
MB	1/Batch (20 samples)	No Target Compounds>1/10 concentration in associated samples	Assess impact on data; Re-extract or qualify data as necessary	Analyst/Section Supervisor	Accuracy/Bias Contamination	No Target Compounds>1/10 concentration in associated samples
Instrument Blank	Once per 12 hours if MB is not run	No Target Compounds>1/10 concentration in associated samples	Assess impact on data; Re-extract or qualify data as necessary	Analyst/Section Supervisor	Accuracy/Bias-Contamination	No Target Compounds>1/10 concentration in associated samples
Equipment Rinsate Blank	1 per week per sampling team per task	No Target Compounds>1/10 concentration in associated samples	Assess contamination sources in the field and/or in supplies; qualify data as necessary	AECOM FTM/ Data Validators	Accuracy/Bias Contamination	No Target Compounds>1/10 concentration in associated samples

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Batch Control Spike	1/Batch (20 samples)	Native compounds by isotope dilution %D vs. ICAL ≤ 30%; Native compounds measured against an isotopic isomer vs. ICAL %D = 50%; Labeled standard %D vs. ICAL ≤ 50%; Native Compound RPDs ≤ 20% for isotope dilution and ≤ 30% for isotopic isomer; Standard RPDs ≤ 50%	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias	Native compounds by isotope dilution %D vs. ICAL ≤ 30%; Native compounds measured against an isotopic isomer vs. ICAL %D = 50%; Labeled standard %D vs. ICAL ≤ 50%; Native Compound RPDs ≤ 20% for isotope dilution and ≤ 30% for isotopic isomer; Standard RPDs ≤ 50%
Pre-extraction Internal Standards	Spiked into every sample and QC sample	Per EPA Method 1668B Table 6	Check all calculations for error; ensure that instrument performance is acceptable; assess impact on data; re-extract or qualify data as necessary.	Analyst/Section Supervisor	Accuracy/Bias	Per EPA Method 1668B Table 6
Static Spikes	Spiked into each sorption media prior to sampling	50-150%	NA, used for informational purposes only	NA, used for informational purposes only	Accuracy/Bias	50-150%
Dynamic Spikes	Spiked once into sample stream post filtration/pre PUF when approximately 50% of water volume to be sampled has been pumped	25-150%	NA, used for informational purposes only	NA, used for informational purposes only	Accuracy/Bias	25-150%
Field Duplicate	1/20 field samples	RPD ≤ 50% if both samples are > 5x	Evaluate during data	Data Validators	Precision[a]	RPD ≤ 50% if both

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

		EML	validation. Qualify data.			samples are >5x EML

[a] Field duplicates (co-located samples) will be the only precision DQI for the HV solids samples. Laboratory duplicates are not possible, as the entire sample is required for the extraction, and cannot be split.

Matrix	Separated Solids
Analytical Group	PCDD/Fs
Concentration Level	Low
Sampling SOP	SW-19
Analytical Method/ SOP Reference	AP-1
Sampler's Name	AECOM Field Staff
Field Sampling Organization	AECOM
Analytical Organization	Analytical Perspectives (Wilmington, NC)
Number of Sample Locations	6

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	Measurement Performance Criteria

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

MB	MB - 1/Batch (20 samples);	a) No Target Compound >25% of adjusted QL b) If detected, the concentration should be less than the QL or <10x the highest concentration found in the sample batch; c) S/N should be >10:1 for isotopically labeled standard added before extraction; d) EDL ≤ 50% of the adjusted QL	Reanalyze affected samples. A B qualifier is applied to any specific analyte detected in the MB at a concentration above the RL, or the level detected in the blank that is statistically significant relative to that found in the associated sample. An invalid MB requires re-extraction and reanalysis of the samples.	Analyst/Section Supervisor	Accuracy/Bias-Contamination	a) No Target Compound >25% of adjusted QL b) If detected, the concentration should be less than the QL or <10x the highest concentration found in the sample batch; c) S/N should be >10:1 for isotopically labeled standard added before extraction; d) EDL ≤ 50% of the adjusted QL
MB (con't.)		e) recoveries of the isotopically labeled standard should be 40% minimum or meet the requirements of c and d above				e) recoveries of the isotopically labeled standard should be 40% minimum or meet the requirements of c and d above
Equipment Rinsate Blank	1 per week per sampling team per task	No Target Compounds >QL	Assess contamination sources in the field and/or in supplies; qualify data as necessary.	AECOM FTM/Data Validators	Accuracy/Bias-Contamination	No Target Compounds > QL
Labeled Compounds	1/Batch (20 samples)	EDL<PAL, with the exception of 2,3,7,8-TCDD	Reanalyze affected samples if EDL exceeds PAL limit criteria. Qualify data as needed.	Analyst/Section Supervisor	Sensitivity	EDL<PAL, with the exception of 2,3,7,8-TCDD

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

QC Standard	1/Batch (20 samples)	Within statistical control limits	Identify source of variance and assess impact on data reliability. Consider re-extraction and reanalysis of samples if necessary for generating reliable data and sufficient sample is available.	Laboratory Technical Director	Accuracy/Bias	Within statistical control limits
Batch Control Spike	1/Batch (<20 samples)	Native Compound %D (vs. ICAL) ≤ 20%; Labeled Standard %D (vs. ICAL) ≤ 30%; Native Compound RPDs ≤ 10%; Labeled Standard RPDs ≤ 20%	Identify source of variance and assess impact on data reliability. Consider re-extraction and reanalysis of samples if necessary for generating reliable data and sufficient sample is available	Laboratory Technical Director	Accuracy/Bias	Native Compound %D (vs. ICAL) ≤20%; Labeled Standard %D (vs. ICAL) ≤30%; Native Compound RPDs ≤10%; Labeled Standard RPDs ≤20%
Field Duplicate	1/20 field samples	RPD ≤ 50% if both samples are > 5x QL	Evaluate during data validation. Qualify data.	Data Validators	Precision[a]	RPD ≤ 50% if both samples are >5x QL
PE Sample	1	Supplier Certified Limits	Provide feedback to laboratory/laboratory reviews data and implements CA as necessary.	AECOM Chemists/ Laboratory Staff	Accuracy/Bias	Supplier Certified Limits

[a] Field duplicates (co-located samples) will be the only precision DQI for the HV solids samples. Laboratory duplicates are not possible, as the entire sample is required for the extraction, and cannot be split.

Matrix Sorption Media (PUF)

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Analytical Group	PCDD/Fs
Concentration Level	Low
Sampling SOP	SW-19
Analytical Method/ SOP Reference	AP-1
Sampler's Name	Gravity Field Staff
Field Sampling Organization	AECOM
Analytical Organization	Analytical Perspectives (Wilmington, NC)
Number of Sample Locations	6

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MB	MB - 1/Batch (20 samples);	a) No Target Compound >25% of adjusted QL b) If detected, the concentration should be less than the QL or <10x the highest concentration found in the sample batch; c) S/N should be >10:1 for isotopically labeled standard added before extraction; d) EDL ≤ 50% of the adjusted QL	Reanalyze affected samples. A B qualifier is applied to any specific analyte detected in the MB at a concentration above the RL, or the level detected in the blank that is statistically significant relative to that found in the associated sample. An invalid MB requires re-extraction and reanalysis of the samples.	Analyst/Section Supervisor	Accuracy/Bias-Contamination	a) No Target Compound >25% of adjusted QL b) If detected, the concentration should be less than the QL or <10x the highest concentration found in the sample batch; c) S/N should be >10:1 for isotopically labeled standard added before extraction; d) EDL ≤ 50% of the adjusted QL

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

MB (con't.)		e) recoveries of the isotopically labeled standard should be 40% minimum or meet the requirements of c and d above				e) recoveries of the isotopically labeled standard should be 40% minimum or meet the requirements of c and d above
Equipment Rinsate Blank	1 per week per sampling team per task	No Target Compounds >QL	Assess contamination sources in the field and/or in supplies; qualify data as necessary.	AECOM FTM/Data Validators	Accuracy/Bias-Contamination	No Target Compounds > QL
Labeled Compounds	1/Batch (20 samples)	EDL<PAL, with the exception of 2,3,7,8-TCDD	Reanalyze affected samples if EDL exceeds PAL limit criteria. Qualify data as needed.	Analyst/Section Supervisor	Sensitivity	EDL<PAL, with the exception of 2,3,7,8-TCDD
Static Spikes	Spiked into each sorption media prior to sampling	70-130%	NA, used for informational purposes only	NA, used for informational purposes only	Accuracy/Bias	70-130%
Dynamic Spikes	Spiked once into sample stream post filtration/pre PUF when approximately 50% of water volume to be sampled has been pumped	40-130%	NA, used for informational purposes only	NA, used for informational purposes only	Accuracy/Bias	40-130%

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

QC Standard	1/Batch (20 samples)	Within statistical control limits	Identify source of variance and assess impact on data reliability. Consider re-extraction and reanalysis of samples if necessary for generating reliable data and sufficient sample is available.	Laboratory Technical Director	Accuracy/Bias	Within statistical control limits
Batch Control Spike	1/Batch (<20 samples)	Native Compound %D (vs. ICAL) ≤ 20%; Labeled Standard %D (vs. ICAL) ≤ 30%; Native Compound RPDs ≤ 10%; Labeled Standard RPDs ≤ 20%	Identify source of variance and assess impact on data reliability. Consider re-extraction and reanalysis of samples if necessary for generating reliable data and sufficient sample is available	Laboratory Technical Director	Accuracy/Bias	Native Compound %D (vs. ICAL) ≤20%; Labeled Standard %D (vs. ICAL) ≤30%; Native Compound RPDs ≤10%; Labeled Standard RPDs ≤20%
Field Duplicate	1/20 field samples	RPD ≤ 50% if both samples are > 5x QL	Evaluate during data validation. Qualify data.	Data Validators	Precision[a]	RPD ≤ 50% if both samples are >5x QL

[a] Field duplicates (co-located samples) will be the only precision DQI for the HV solids samples. Laboratory duplicates are not possible, as the entire sample is required for the extraction, and cannot be split.

Matrix	Water
Analytical Group	General Chemistry - POC
Concentration Level	Low
Sampling SOP	LPR-FI-04
Analytical Method/ SOP Reference	C-16
Sampler's Name	AECOM Field Staff
Field Sampling Organization	AECOM
Analytical Organization	Columbia Analytical Services (Kelso)

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Number of Sample Locations 6

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MB	1/Batch (10 samples)	<0.025 mg/L or <10% of the concentration in the associated samples	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias Contamination	<0.025 mg/L or <10% of the concentration in the associated samples
Equipment Rinsate Blank	1 per event per sampling team	No target compound >QL	Assess contamination sources in the field and/or in supplies; qualify data as necessary.	AECOM FTM/Data Validators	Accuracy/Bias Contamination	No target compound >QL
LCS	1 per 10 samples	95-105%R or within the manufacturer's control limits if >95-105%R	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias	95-105%R or within the manufacturer's control limits if >95-105%R
LFB	1 per 10 samples	85-115%R	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias	85-115%R
Laboratory Duplicate	1 per 10 samples	RPD ≤20% if both samples >10x QL	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Precision	RPD ≤20% if both samples >10x QL
Field Duplicate[a]	1/20 field samples	RPD ≤30% if both samples are >5x QL or absolute difference between concentrations <2x QL if sample and/or field duplicate are ≤5x QL	Evaluate during data validation. Qualify data as needed	Data Validator	Precision	RPD ≤30% if both samples are >5x QL or absolute difference between concentrations <2x QL if sample and/or field duplicate are ≤5x QL

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

[a] The field duplicate will consist of a second subsample collected from the 20L carboy.

Matrix	Water
Analytical Group	DOC
Concentration Level	Low
Sampling SOP	LPR-FI-04
Analytical Method/ SOP Reference	C-13, C-16
Sampler's Name	AECOM Field Staff
Field Sampling Organization	AECOM
Analytical Organization	Columbia Analytical Services (Kelso)
Number of Sample Locations	6

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MB	1/Batch (20 samples)	No target compound>QL	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias Contamination	No target compound >QL
Equipment Rinsate Blank	1 per event per sampling team	No target compound >QL	Assess contamination sources in the field and/or in supplies; qualify data as necessary.	AECOM FTM/Data Validators	Accuracy/Bias Contamination	No target compound >QL
LCS	1/Batch (20 samples)	95-109%R	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias	95-105%R
LCSD	1/Batch (20 samples)	RPD ≤20%	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Precision	RPD ≤20%

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

Inorganic Carbon Spike	1/Batch (20 samples)	≤110% of the unspiked sample	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias	≤110% of the unspiked sample
MS	1/Batch (20 samples)	80-120%R	Flag data. Discuss in narrative.	Analyst/Section Supervisor	Accuracy/Bias	80-120%R
MSD	1/Batch (20 samples)	RPD ≤20%	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Precision	RPD ≤20%
Field Duplicate[a]	1/20 field samples	RPD ≤30% if both samples are >5x QL or absolute difference between concentrations <2x QL if sample and/or field duplicate are ≤5x QL	Evaluate during data validation. Qualify data as needed	Data Validator	Precision	RPD ≤30% if both samples are >5x QL or absolute difference between concentrations <2x QL if sample and/or field duplicate are ≤5x QL

[a] The field duplicate will consist of a second subsample collected from the 20L carboy.

Matrix	Water
Analytical Group	SSC
Concentration Level	Low
Sampling SOP	LPR-FI-04
Analytical Method/ SOP Reference	C-17

Sampler's Name	AECOM Field Staff
Project Organization	AECOM
Laboratory Name and Contact	Columbia Analytical Services (Kelso)
Number of Sample Locations	6

Air Water Column Monitoring/High Volume Chemical Data Collection
Passaic River Restoration Project
New Jersey

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) QC Samples Table

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MB	1/Batch (20 samples)	No target compound >QL	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Accuracy/Bias Contamination	No target compound >QL
Equipment Rinsate Blank	1 per event per sampling team	No target compound >QL	Assess contamination sources in the field and/or in supplies; qualify data as necessary.	AECOM FTM/Data Validators	Accuracy/Bias Contamination	No target compound >QL
Laboratory Duplicate	1/Batch (20 samples)	RPD ≤20%	Reanalyze affected samples. Qualify data as needed.	Analyst/Section Supervisor	Precision	RPD ≤20%
Field Duplicate[a]	1/20 field samples	RPD ≤30% if both samples are >5x QL or absolute difference between concentrations <2x QL if sample and/or field duplicate are ≤5x QL	Evaluate during data validation. Qualify data as needed	Data Validator	Precision	RPD ≤30% if both samples are >5x QL or absolute difference between concentrations <2x QL if sample and/or field duplicate are ≤5x QL

[a] The field duplicate will consist of a second subsample collected from the 20L carboy.